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ABSTRACT
        Educational theorists frequently use the term "model"
to denote a simplified picture of the reality of a theoretical
approach or a school of thought. In branches of empirical science,
including education, experimental data are often correlated with
mathematical symbols, which makes it possible to interconnect these
symbols in an exact way. Models can be used to explain causal
relationships or to test hypotheses and theories. Although models
present simplified pictures of reality, they are seldom exclusively
descriptive; rather, they tend to show causal relations and clarify
which variables in a given system are dependent and which are
ind.pendent. Other types of models that have been used in writings
about education are the hierarchical model and the algorithm-type
model. Another type of simplifying model is one that aims at
delineating concepts and areas of research. In many cases, the
dividing line between an argumentative outline of a theory (or
description) and a model is far from clear. Educational theorists
have relied on both functional and normative models. Some of these
represent positions within a philosophy of education leading to
explicit concerns about ideological issues. On the other hand, they
aim at guiding the teaching-learning process and thus develop various
schemes that systematize the concepts that are important to them. The
difference between functional and normative educational models may be
viewed in terms of contrasting attempts to separate scholarship from
value judgments and attempts at normative pedagogy. A 79-item
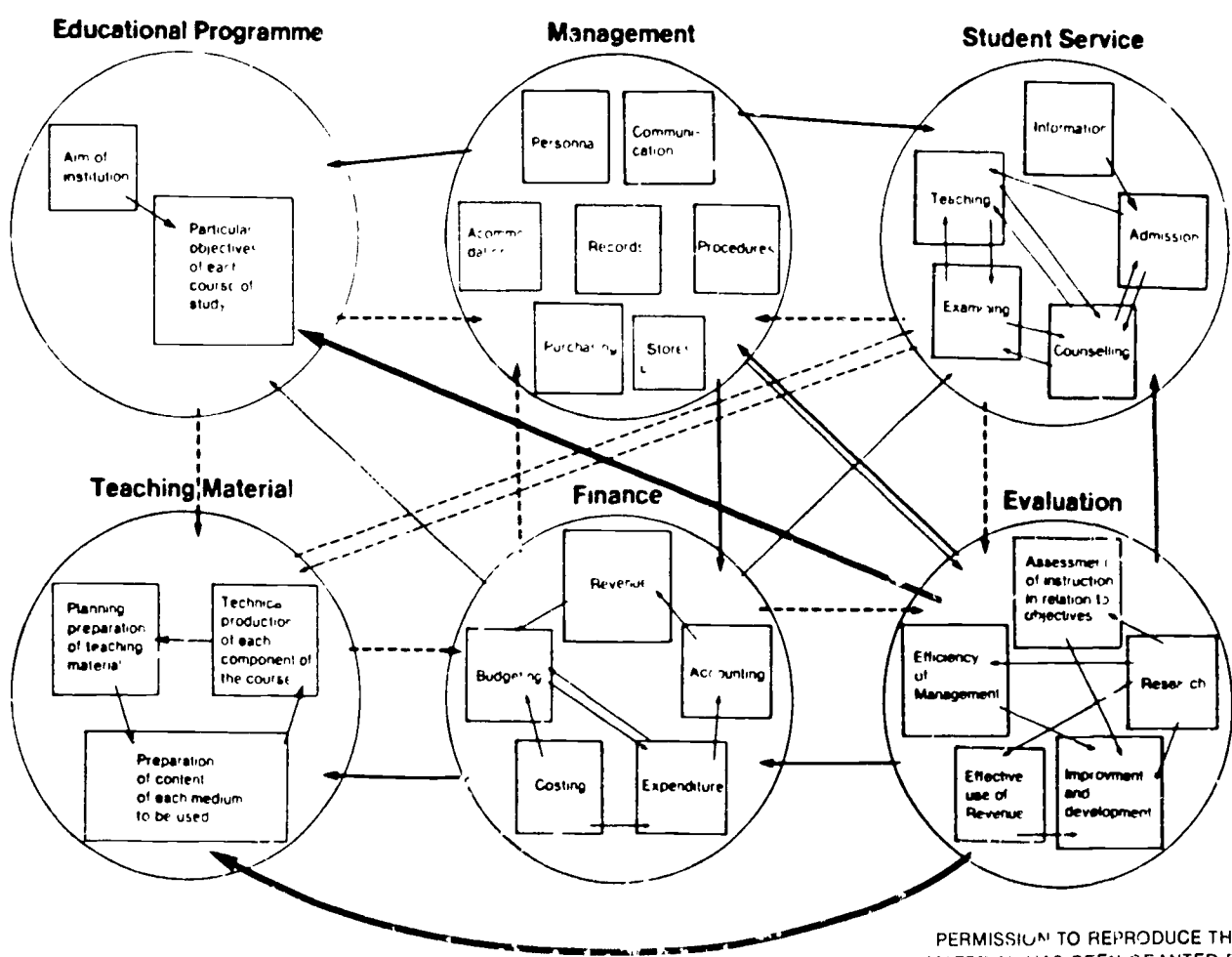reference list concludes the document. (MN)

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THEORETICAL APPROACHES, CATEGORIES AND METHODS DESCRIBED AS EDUCATIONAL MODELS

Zentrales Institut für Fernstudienforschung
Hagen, Februar 1986

2

SUMMARY

This study analyses some important applications of the model concept and the interpretation of the term model as theory and as general approach. The model concept is shown to be vague. Nevertheless, the description of a research phenomenon in education as a model can be useful if referring to distinctive, clearly delineated approaches. It can then include factual descriptions, presentations of hypothetical relations between variables and general interpretations of educational phenomena.

The study made of various well-known 'models' has caused a survey of important theoretical approaches, categories and methods used in education and educational research. Those discussed represent a selection which, though not wholly idiosyncratic, was made both with a view to including some German thinking largely unknown outside the German-speaking countries and on the basis of personal interest.

An essential distinction is made between functional and normative educational models, which implies contrasting attempts to separate scholarship from value judgements with attempts at normative pedagogy.

ZUSAMMENFASSUNG

In diesem Papier werden einige wichtige Anwendungsformen des Modellbegriffs analysiert sowie seine Interpretation aus Theorie und als allgemeiner Ansatz. Der Modellbegriff erweist sich dabei als recht vage. Dennoch kann es nützlich und sinnvoll sein, einen Forschungsgegerstand in der Pädagogik als Modell zu beschreiben, wenn man sich auf spezifische, klar abgegrenzte Ansätze bezieht. Die Beschreibung von Fakten, die Darstellung hypothetischer Zusammenhänge zwischen Variablen und allgemeinen Interpretationen von Phänomenen aus der Pädagogik können dann mit einbezogen werden.

Die Untersuchung einiger bekannter "Modelle" hat zur Erstellung einer Übersicht über wichtige theoretische Ansätze, Kategorien und Methoden - die in der Pädagogik und der erziehungswissenschaftlichen Forschung entwickelt wurden - geführt. Bei der Auswahl der behandelten Modelle, obwohl sie nicht vollkommen idiosynkratisch war, spielte sowohl der Wunsch, deutsche Konzepte einzubeziehen, die außerhalb der deutschsprachigen Länder weitgehend unbekannt sind, als auch persönliches Interesse, eine Rolle.

Es wurde eine grundsätzliche Unterscheidung zwischen funktionalen und normativen Erziehungsmodellen gemacht. Diese Unterscheidung impliziert gegensätzliche Versuche, Wissenschaft und Werturteile, die auf eine normative Pädagogik abzielen, von einander zu trennen.

INHALTSVERZEICHNIS / CONTENTS   Seite / Page

5

The model concept

The term model occurs with fairly great frequency in scholarly presentations of economical, social and educational problems. In many cases it seems to be used rather vaguely, however. This vagueness is illuminated in the following extract from Nuthall & Snook 1973.

> In general, it can be said that a model may be used for imitation, description, explanation, prediction or persuasion. An artist imitates his model, and a model child is one to be imitated. A map of France and a diagram of the human body are iconic models which a lecturer may use to help him describe the landscape of a country or the physiology of human beings. A scientist may use analogue and symbolic models to explain data, to suggest predictions, or to stimulate factors which cannot be manipulated in the real world. Finally, a model may be used to persuade people to adopt some policy or ideal: "melting pot" and "brotherhood of man" are examples of this kind of model (cf. MacIver & Holdaway 1966).
>
> Within education the term "model" is used in similarly diverse ways. Model teachers and model lessons are used as exemplars for teachers to imitate and as standards for evaluation. Educational practice has been described and justified, praised and condemned in terms of authoritarian, democratic, child-centered and traditional models.
>
> (Nuthall & Snook 1973 p. 47)

Whereas mathematicians sometimes identify model theory with semantics[1], the model concept is frequently used by economists, educationists and others to denote a simplified picture of

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1 Thus Kreisel, G. & Krivine, J.L. (1972) refer to 'model theory also called "semantics"'. They add: 'Die für die Modelltheorie grundlegenden Begriffe beziehen sich auf: verschiedene Arten von Sprachen; deren Realisierungen, d.h. geeignete Klassen von mathematischen Strukturen, und Modelle einer Formel(menge) der betrachteten Sprache, d.h. Realisierungen, die die Formel(n) erfüllen ' (from Introduction I to the German translation/by J. Jung/, p. IX).

reality of a theoretical approach or of a school of thinking.
In empirical science, including education, experimental
data are often correlated wi*'' mathematical symbols, which
makes it possible to interconnect these symbols in an
exact way. Schemes of this kind are usually referred to
as models.

Models in educational disciplines: types and examples

A model illustrating assumed causal relations in education
can look like this:

Intelligence

Pupils
achievements

Parental
support

Motivation
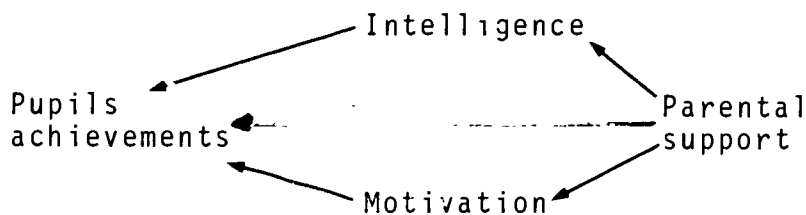
This model[2] shows the assumption of direct causal influence
on pupils' school achievements of the home atmosphere and
family customs (reading, conversations about cultural
matters, theatre-going etc.),but also the indirect influence
of the family which is taken to promote on the one hand
intelligence, on the other hand motivation. Both are supposed
to lead to good school results. As the model is described in
the graph, parental support is the only independent variable,
however.

However advantageous it may be in this way to develop exact
but simplified presentations there is, in education as well
as in other areas of research, a risk that important nuances

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2 I owe this example to Dr. Frank Faulbaum of the University of Mannheim,
   who used it in a seminar lecture on the testing of social-science
   hypotheses in the FernUniversität Institute for Research into
   Distance Education (ZIFF) on 6 May, 1983.

may be lost in models of this schematic type. This is true
particularly of mathematical models. With Capra we could
say

> that ordinary language is a map which, due to its intrinsic
> inaccuracy, has a certain flexibility so that it can follow
> the curved shape of the territory to some degree. As we make
> it more rigorous, this flexibility gradually disappears, and
> with the language of mathematics we have reached a point where
> the links with reality are so tenuous that the relation of the
> symbols to our sensory experience is no longer evident. This
> is why we have to supplement our mathematical models and
> theories with verbal interpretations, again using concepts
> which can be understood intuitively, but which are slightly
> ambiguous and inaccurate.
> It is important to realize the difference between the mathe-
> matical models and their verbal counterparts. The former are
> rigorous and consistent as far as their internal structure is
> concerned, but their symbols are not directly related to our
> experience. The verbal models, on the other hand, use concepts
> whi' can be understood intuitively, but are always inaccurate
> anu ..ibiguous.
>
> (Capra 1975 p. 34)

It is evident that in education we cannot do without what
Capra calls verbal models. Experience confirms that the
flexibility inherent in them is often combined with the
type of vagueness mentioned by Nuthall & Snook as quoted
above. The unavoidable conclusion is that to be really
useful the model concept must, in educational research,
be less exact than in mathematics. It seems reasonable to
describe clearly delineated approaches to educational
problems as models.

A model is sometimes seen as something ideal, worth imitating,
or as an approved solution with which various attempts,
achievements, curricula or courses are compared. This use of
the model concept is of little interest, however, and need
not cause any discussion. The model concept becomes more of
an issue for discussion when it occurs in designations like
the behaviour-control model, the discovery-learning model,
the rational model (cf. Nuthall & Snook 1973), the organiser
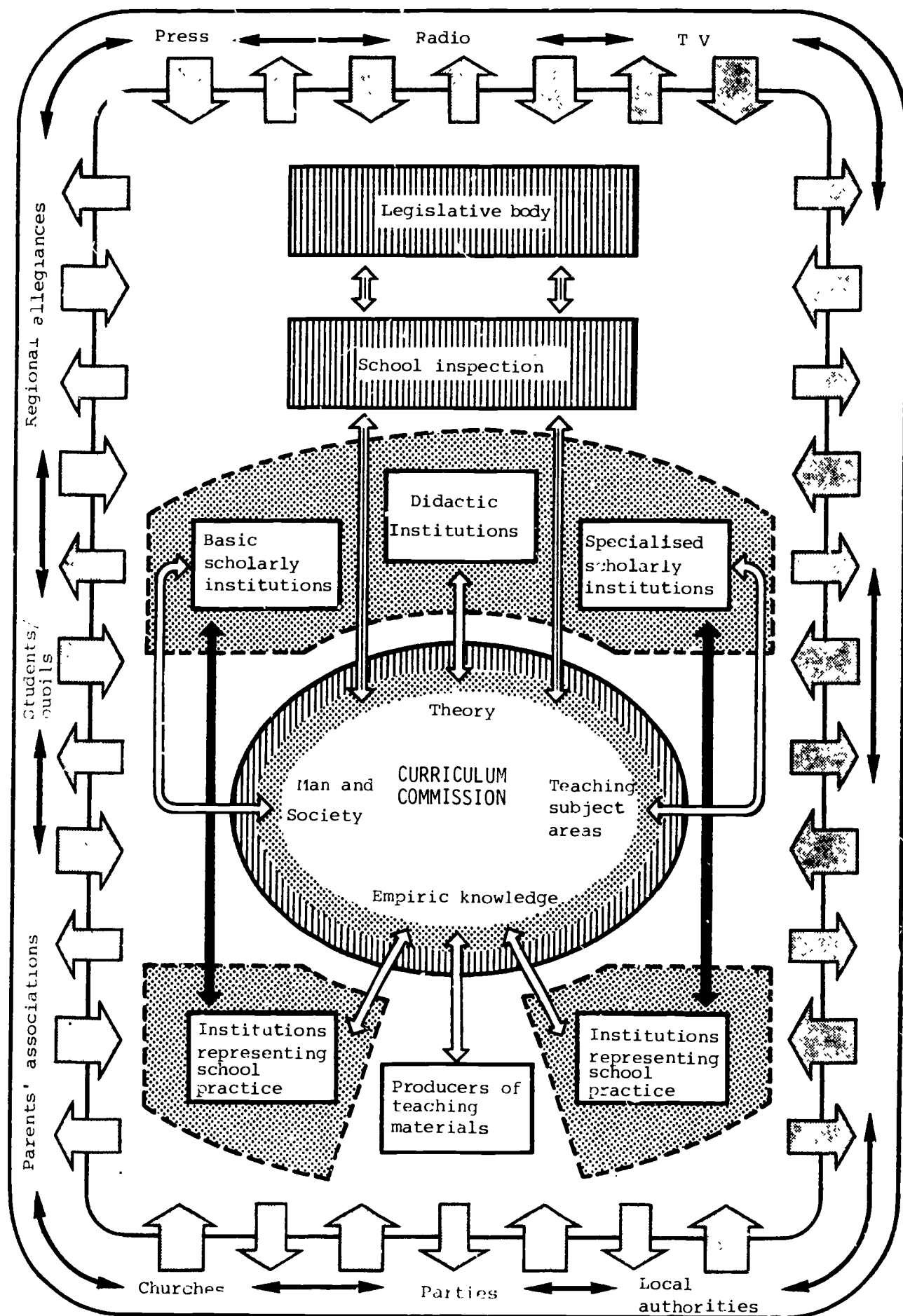model , the model for facilitation of learning (Bå̊th 1979) etc.

From the examples just quoted it would seem possible to

interpret _model_ as a theory. This has also been done, thus, e.g. by Brodbeck 1963, who states that _model_ is frequently used for either highly speculative or quantified theories. She adds that the 'term _model_ serves no particular purpose beyond, perhaps, emphasizing the tentative, unconfirmed nature of the hypotheses in questic ' (Brodbeck 1963 p. 89). This and similar interpretations have been energetically contradicted, however, by others who regard models as support to clear thinking in that only essentials are included. According to Krömphardt & Clever (1980 p. 19) it is essential that a model should not be confused with a theory. They claim that a model should be based on assumptions which have not been and are not meant to be empirically tested. The only statements that can be derived from a model are those that specify the consequences of assumptions made - to the extent that the latter apply.[3]

Whereas this conclusion is no doubt correct, educationists using the model concept often do so with a view to illuminating their testable hypotheses and theories. To Ziegler 1972 a model is a formalised, interpreted part of a theory (p. 19). Apart from referring to systems of hypotheses, models are in educational writings also used in a descriptive way without any specific conditions specified although they may more or less clearly indicate cause-effect relationships. Here their character of simplified pictures of reality stands out. They simplify what is to be described in the same way as a drawing simplifies a picture of a machine in which irrelevant details, visible in a photo, are disregarded. Illustrations 1 and 2 are examples of such descriptive educational models. These illustrations identify both descriptive elements and processes, the latter by arrows indicating lines of influence.

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3 Cf.: "Das Modell ist ein in sich widerspruchsfreies System von
  Hypothesen (Axiomen, Deduktionen, Prognosen), die als prinzipiell
  verifikationsbedürftig begriffen werden - es ist ein Konstrukt
  auf Widerruf" (Popp 1970 p. 50). Cf. further Blalock 1971
  who describes models involving one-way causation as heuristic
  devices 'for broadening the scope of simple regression approaches
  that commonly focus on a single dependent variable and a set of
  "predictors"' (p. 1).

Press ←→ Radio ←→ T V

Regional allegiances

Students/pupils

Parents' associations

Legislative body

School inspection

Didactic Institutions

Basic scholarly institutions

Specialised scholarly institutions

Theory

Man and Society

CURRICULUM COMMISSION

Teaching subject areas

Empiric knowledge

Institutions representing school practice

Producers of teaching materials

Institutions representing school practice

Churches ←→ Parties ←→ Local authorities

A model of teaching based on the Berlin (Hamburg) school of instructional theory (Ruprecht et al. p. 69, translated by the author of this paper)

10

Illustration 2

Distance Education–System and Sub–systems

Educational Programme

- Aim of institution
- Particular objectives of each course of study

Management

- Personnal
- Communication
- Acommodation
- Records
- Procedures
- Purchasing
- Stores

Student Service

- Information
- Teaching
- Admission
- Examining
- Counselling

Teaching Material

- Planning preparation of teaching material
- Technical production of each component of the course
- Preparation of content of each medium to be used

Finance

- Revenue
- Budgeting
- Accounting
- Costing
- Expenditure

Evaluation

- Assessment of instruction in relation to objectives
- Efficiency of Management
- Research
- Effective use of Revenue
- Improvment and development

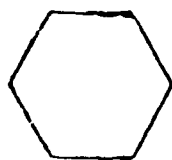A systems description of distance education in model form (Erdos p. 11)

The simplified pictures of reality that models represent
are nevertheless seldom exclusively descriptive. As indicated
(cf. the Blalock quotation in footnote 3) they tend to show
causal relations and to make clear what in a system are the
independent and dependent variables. A somewhat sophisticated
example where this is explicitly the case is provided by
Nilsen 1975 in his study of the dissemination of new types
of teaching and learning in adult education. In his model
(illustration 3) results (students' achievements) and
input (time, money) are the dependent variables, whereas
frame factors and methods are independent variables. Input
variables can be selected by the input being specified in
advance. When investigated the results then become dependent
variables. It is also possible to select the results by
deciding in advance that the educational activity is to
continue until certain results have been achieved. When
measured, the input then becomes the dependent variable
(Nilsen 1975, I, p. 13). In a similar way methods can be
selected whereas, in principle, the frame factors are given.

In his study Nilsen elaborates this model with a view both
to describing teaching/learning and to describing the
dissemination and adoption of innovations.

Frame variables

Students' pre-conditions or prerequisites	External frames	Goals

Variables of method

A

TM

IM

T   S

Variables of result

Variables of input

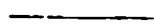| Time	Money	Other input
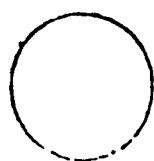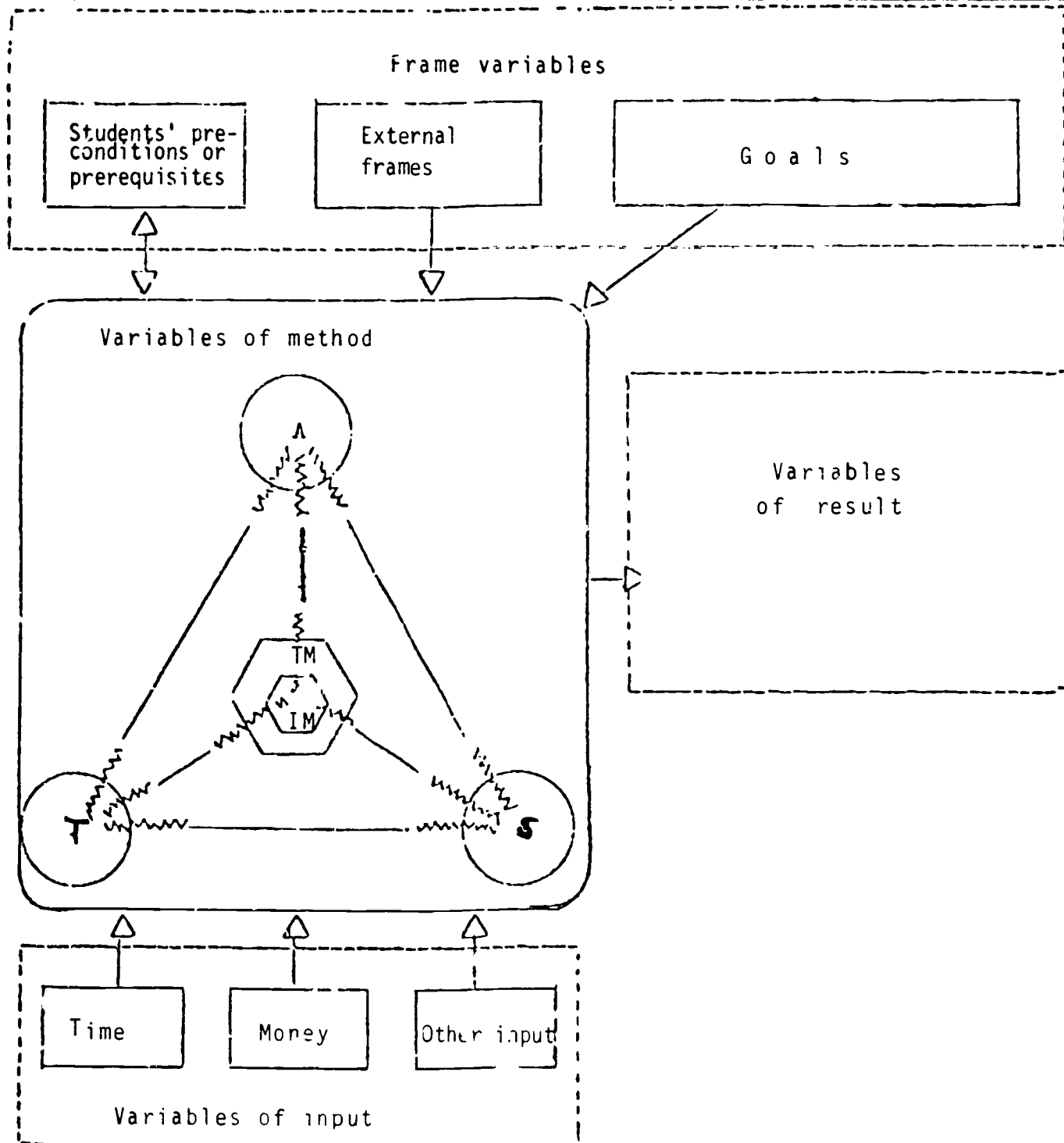
People

A   Administration
T   Teacher
S   Student

Material

IM   Material with stored information
TM   Technical materials

——————   Relations

〜〜〜〜〜   Processes

13

Illustration 3.
simplified and translated version of Niisen's model for the description of teaching
(Nilson 1975, I, p. 15)
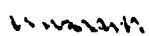
Nilsen's presentation has an evident model character in that
by means of key words, defined abbreviations, arrows and
symbols denoting relations and processes a kind of scheme
explaining his approach is created. This also applies to
the descriptive models mentioned above and to a number of
other approaches to the problems of education. A case in point
seems to be Gagné's well-known hierarchical description of
the forms of learning, from signal learning, stimulus-
response learning, etc. to problem solving (Gagné 1977).

A consistent application of a mathematical model in the
form of 'formalised concept maps in a science of education'
occurs in van Rooyen & Wolvaardt 1982. It is of an
algorithmic character unlikely to attract non-behaviourists
as it sees 'teaching as an attempt to construct a copy
(model) of the teacher's current schema in the student's
mind' (p. 51).

A fourth type of simplifying model is one which aims at
delineating concepts and areas of research. Boyd & Apps 1980
have developed such a conceptual model for adult education
based on 'transactional modes' (characterising the nature of
the learner's situation: independence and individual,
group or class learning, adults' learning as members of a
community), 'client forms' (indicating who is to benefit
from the educational activity - 'the individual, the group or
the community') and 'personal, social and cultural systems'.
The originators comment:

> Our model for adult education now has three dimensions -
> transactional mode, client focus, and system - each of which
> has three aspects. By visualizing a cube - each plane of
> which represents one of our educational dimensions, one may
> locate a given program in terms of three coordinates: its
> transactional mode, client focus, and predominant system.
>
> Using this model, we may now consider the goals of
> educational activities. The paramount goal of educational
> enterprises is growth: the growth of an individual, a group,
> or a community.
>
> (Boyd & Apps 1980 pp. 10 - 11)

It is claimed that this model makes several contributions
to the field of adult education:

First, this model contributes to demarcating a conceptual
structure of the nature and parameters of adult education.
The field of adult education, because it has relied heavily
on other disciplines for its concepts, has suffered. Lacking
an identity, a foundation that describes the field, adult
education has grown and developed without any clear
direction of what it is and what it should accomplish.

Second, our model provides a framework for identifying
and organizing problems in adult education. Using the model,
we can systematically identify problems and questions and
see the relationships among them.

Third, this model is based on the structure of adult education,
not on disciplines such as philosophy, psychology, or sociology.
It provides a framework within which we can evaluate the
applicability of theories and concepts developed in other
fields.

Fourth, the model integrates instruction and curriculum.
Traditional views of education have often divided form and
content, and have done violence to both in the process. Our
model considers both as interwined in educational transactions.
We look not on instruction, not on curriculum, but on
educational transactions.

Fifth, our model incorporates social and cultural value systems.
Although a given program may focus on the growth of the
individual adult student, administrators and instructors should
not, indeed cannot, ignore cultural and social systems. Our
model provides a structure by which we may examine systematically
these various components of educational plans and programs.

(ibidem p. 13)

In this and other cases the line of division between an
argumertative outline of a theory - or a description - and
a model is far from clear. The behaviourist stimulus-response
theory, Ausubel's organiser theory and even Rogers' freedom-
to-learn philosophy have - as indicated above - been
described as models (cf. Bååth 1979), probably more
because of their unmistakably distinctive characters than
because of any simplifying description or presentation
isolat ng dependent and independent variables. What in the
educational debate is called a model, an approach or a
theory seems often to depend on personal predilection rather
than on clear-cut distinctions between these concepts.
Certainly few educationists would object if, for instance,
the Montessori rr Steiner (Waldorf) types of education were

described as models.

What has been said so far will have illustraced what types
of approaches have been regarded as educational models
because of their distinctive characters. There are a number
of competing schools of thinking that could claim to be
models in this sense. One philosophically essential border-
line which could cause a distinction between scholarly
approaches of a model character will be looked into below.
It concerns purely functional approaches attempting as far
as possible to separate scholarship from value judgements
contrasted with attempts at normative pedagogy.

Functional models

One model is called the 'rational model description of
learning' (Nuthall & Snook 1973 pp.67 - 70). It is basically
a non-psychological model based on the application of
analytical philosophy to education. Proponents of this model
see both learner and teacner as rational agents. 'Learning,
therefore, should not be a process to which the student is
subjected but an activity which he performs' (Nuthall &
Snook 1973 p. 67). The same authors insist that 'the learning
at which teaching aims is not definable as a change in
behavior and it cannot be identified with some emotional
reaction on the part of the learner. Teaching aims at
knowledge. A student has learned when he knows, and knowing
cannot be identified with giving answers, even correct
answers' (ibidem).

Real knowing is taken to imply ability not only to give
correct answers but to justify them. 'Learning is contrasted
with conditioning, which suggests the stamping in of
responses by means of reinforcement (Vesey, 1967)' (ibidem
p. 68). As critical standards are found in the traditional
academic disciplines it has been argued that there is a
conceptual link between rationality, knowledge and the
disciplines (Hirst 1965).

Other 'models' that are functional in the sense that they
are concerned not with propagating certain values but with
describing education, finding and prescribing efficient
learning and teaching methods are, for instance, Skinner's
behaviour-control model with its stimulus-response and
condition theory (cf. Skinner 1968, Mager 1962), Ausubel's
cognitive organiser model (Ausubel 1968, Hudgins 1971),
Bruner's discovery learning (Bruner 1971), Gagné's general
teaching model (Gagné 1977), Pask's holist vs. serialist
learning strategies and his conversational theory (Pask
1976a-b, Entwistle 1978) as well as the equally interesting
but less well-known approach called Structural Communication
originally developed by J. G. Bennett and A. M. Hodgson
(Egan 1976). Like the so-called rational model briefly
described above, Ausubel and the structural-communication
model reject behaviourism and its view of learning as
conditioning. Learning is seen as the subsumption of new
learning matter under already existing cognitive
structures and is characterised by understanding rather
than merely answering or 'behaving' correctly.[4] The issues
concerned here are too well known to require further
comment. The models as such are thoroughly looked into by
Bååth 1979; classical exponents of the behaviourist-
cognitivist controversy are to be found in Skinner 1957
and Chomsky 1959.

Cybernetic approaches have led to educational models of
interest. Helmar Frank's and Felix von Cube's contributions
stand out in this context. They base their thinking partly
on psychological behaviourism, partly on mathematical
information theory. Learning is seen as communication of
information from a sender to a receiver. The receiver does

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4 It is perfectly possible to make the right operation for the wrong
   reason, as shown by the following example borrowed from Lewis 1974 p. 16.
   Anyone who believes that .3 x .3 makes .9 (instead of .09) and
   that .2 x .2 makes .4 (instead of .04) will no doubt, on the basis
   of a false understanding, come to the conclusion that .3 x .5 = .15,
   which happens to be correct. It is evident that the operation is
   not enough; attention must be paid to the understanding (justification)
   on which it is based.

not only receive the information, but stores and processes it. A statistical concept of information as something derived from probability is characteristic of the cybernetic approach, the idea being that certain elements of the learning material can be foreseen by the student. Since different receivers have different prior knowledge and different learning potential, a concept referred to as subjective information is introduced.

Cybernetics is a science not only of communication but also of control. The teaching/learning process is seen as an attempt to create a regulating circular movement, e.g. of the thermostat model. A change in one part of the circle is counteracted by developments or actions in other parts. This can be compared with a pilot's reactions to winds and currents. Immediate feedback in programmed learning represents part of this movement. The anticipation of a student's response and the development and programming of a corrective measure on the basis of an 'optimal strategy' are the necessary prerequisites. To develop algorithms for the optimisation of teaching is regarded as an important aim.

According to cybernetic theory learning implies that order is attained. This means that what occurs does not happen at random, but in a series that makes sense. Order is created through three learning processes, i.e. probability learning, on which see below, storage of information and supersign formation, i.e. the uniting of individual elements into larger units of knowledge (supersigns) allowing a greater amount of information to be stored in the long-time memory. Human capacity for informal approximations and supersign formation including new material into categories already assimilated leads to a reduction of the amount of information that is to be assimilated and thus influences learning behaviour. The less information that is to be assimilated in the long-time memory, the quicker is the assimilation.

Felix von Cube has developed this thinking into a
cohesive redundancy theory based on a cybernetic approach,
mathematically defining the probability of what a student
can foresee. The gist of the redundancy theory can be
described as follows: each study task contains a certain
amount of information that is to be absorbed. Each item of
prior knowledge and each step on the path of learning
leads to a reduction of the amount of information left,
and so does the capacity to form supersigns with the
inclusion of new knowledge matter in its proper context.
To the individual student the task then contains redundant
information apart from what remains to be learned. The more
that is learned, the smaller the amount of remaining
subjective information and the greater the redundancy.
Felix von Cube explains all learning processes by means
of this theory. The fact that meaningful material is learnt
more quickly than meaningless material is explained by the
higher statistical redundancy in the meaningful material;
thus the amount of information per unit to be learned is
lower than in the meaningless material. Similar
explanations are given of conditioning and learning by
success.

Another functional German model of interest is the one known
as the Berlin or Hamburg school. Paul Heimann is the founder
of the Berlin school of didactics, a creation of the early
1960s, also characterised as lerntheoretisch (based on
learning theory), kritisch and lehrtheoretisch (based on
instruction theory). Heimann's chief disciple, Wolfgang
Schulz, must probably be regarded as an equally important
representative of this school as the originator. Both
stress the implicational connections existing between
decisions on content and those on method. Every teaching
method, they claim, is on one hand based on decisions
already made about content; on the other hand, aims and
objectives cannot be set without attention being paid to
the methods to be used in trying to attain them.

The Berlin school (which - as the 'Hamburg model' - is
now centred in Hamburg, where Wolfgang Schulz has his
chair) has developed a scheme for didactic decisions.
It includes:

1 The aims of the teaching (Intentionalität); in
  a way seemingly parallel to Bloom and Krathwohl
  and their followers in the USA the cognitive,
  affective and psychomotor dimensions are stressed.
2 The concerns of the subject taught (Thematik);
  structuring according to logical and psycho-
  logical principles; methodological questions
  specific for the subject taught (Fachdidaktik).
3 The methodology inclusive of: (a) the teacher's
  activity, (b) the organisation of the teaching
  (measures conducive to special learning processes
  like holistic vs. atomistic presentation, project
  method, programmed learning (etc.), (c) the social
  type of teaching situation (lecturing, conversation,
  group work), (d) the forms of action (lectures
  ex cathedra, questions, demonstrations, exercises,
  etc.) and (e) the teaching style (authoritarian,
  participative, etc.).
4 The selection of media.

Two further considerations belong to the four parts of the
model. They concern the conditions of learning and teaching,
the so-called anthropogenic, i.e. individual factors, and
socio-cultural conditions (Ruprecht in Ruprecht et al 1975
p. 63 and Blankertz 1975 p. 102). These lead to a study
of various societal frame factors and to a discussion of
the influences on education of social and other ideas.

It is typical of the Berlin school that it insists on
continuous criticism of ideologies (permanente Ideologie-
kritik). This may be interpreted as a wish to reveal any
bias and partisan presentation, to see through prejudices
and thus to separate value judgements from statements made in
the name of scholarship and research. Considering the fact

that in German usage ideology often has a pejorative
connotation, a less satisfactory interpretation may not
be entirely impossible, i.e. that those opinions are to be
criticised which in a given social situation are not
considered acceptable (élitism, capitalism, imperialism,
or liberalism etc.).

Normative models

In fact, whereas Heimann explicitly favours the former
interpretation, Schulz appears to be under the influence
of the second. In one work in which he pleads for some
morally attractive principles like emancipation, solidarity
and unveiling of vested interests, he seems implicitly to
claim that another value judgement of his has scholarly
status, i.e. his negativism against 'rational means-ends
methods' (Zweckrationalität) to the extent that they do not
serve his emancipatory ideals (Schulz in Ruprecht et al
1975, pp. 176, 130 - 181).

As indicated above, the school under discussion is now
centred round the Hamburg chair of Wolfgang Schulz. In a
recent paper (Schulz 1980) Schulz has confirmed his
adherence to the principles referred to at the same time
as he has modified the approach to some extent. To indicate
developments and modifications Schulz uses as a sub-head
in his paper the expression 'From the Berlin to the Hamburg
model'. What was said above about Heimann's and Schulz's
discussions of ideology seems relevant here. Typical of
the new developments is a reserved attitude to unbiased
and unengaged research as it were from a distance, which,
Schulz believes, may conceal existing motives and weaken
the link between theory and reality.

This implies conscious inclusion of value judgements in
scholarly work. A number of vociferous educationists
expressly favour partisanship in educational research.
They occur everywhere, but seem to play a particularly

important part in the educational debate in the Socialst countries[5] as well as in West Germany. In West Germany radical social zeal as emanating from, for instance, the Frankfurt School of the Social Sciences (Adorno, Horkheimer, Habermas etc.) has to some extent been allied with a German tradition inherent in the so-called Bildungstheoretische Didaktik, i.e. didactics based on theories concerning the content of education.

Bildung - the result of education in a human being - is the basic concept of the so-called hermeneutic[6], historical 'bildungstheoretische' approach of Wilhelm Dilthey, developed further by Hermann Nohl, Erich Weniger, Joseph Derbolav, Wolfgang Klafki and others. This school is mainly concerned with deliberations about the very concept of education, its content and consequences (Bildung). Bildung is taken to mean the totality of motivation, knowledge,

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5 Cf. the following Czech testimony as translated into German and published in East Berlin: 'Mit diesem Ausdruck ("marxistische Pädagogik") wird betont, daß der dialektische und historische Materialismus, die marxistische Philosophie als Ganzes, die weltanschauliche und methodologische Grundlage der modernen Padagogik ist, ganz gleich, ob sie von Wissenschaftlern in sozialistischen oder in kapita..stischen Ländern entwickelt wurde. Die marxistische Pädagogik entstand durch kritische Überwindung und prinzipielle Umarbeitung sowie durch konstruktive Bewahrung alles Positiven im pädagogischen Denken und in den pädagogischen Bestrebungen der Vergangenheit und Gegenwart. ... Wesenszug der wissenschaftlichen Qualität der marxistisch-lenistischen Pädagogik is ihr parteilicher und gesellschaftlich engagierter Charakter. Unter Parteilichkeit der marxistisch-leninistischen Pädagogik verstehen wir die theoretische Widerspiegelung der erzieherischen Erscheinungen, die den objektiven Interessen und Entwicklungsgesetzmäßigkeiten der sozialistischen und kommunistischen Gesellschaft entspricht und die sich in Einklang mit dem Marxismus-Leninismus - der wissenschaftlichen Ideologie der Arbeiterklasse, deren höchster humanistischer Wert in der allseitigen Entwicklung der Fersonlichkeit besteht - befindet.

Grulich 1978 pp. 25 - 26

6 The term hermeneutic originally concerned text analysis. In German educational literature it refers to studies of the reality of teaching and descriptions of this reality.

skills and attitudes and their integration with one another.
Educational values, largely of an ethical character, are
understood as something transcending the acquisition of
subject content and specific affective study objectives.
Implicitly the attempts to define Bildung include the
question of what it means to be an educated man or woman.

The stress is on aspects of content rather than on methods
of study. This, however, does not imply emphasis on
curricula designed as preparation for specific work
situations, but, instead, on more general reflections on
education and society (Blankertz 1975 p. 28). One important
representative of this school, Joseph Derbolav, in 1957
referred to man being humanised by the filtering of
intellectual knowledge in the conscience[7], which may serve
as an illustration of its aspirations. Another present-day
leading representative, Wolfgang Klafki, is respected in
Germany for having defined Bildung as a uniting category
bridging the gap between the claims of the objective world,
which can include a canon of knowledge, and the individual's
right to his own life. A field of study, a subject, is seen
as suitable for educational intentions to the extent that
its content can be accepted as conveying Bildung.
This seems to mean that it contributes more than what is
specific to the subject itself, i.e. a kind of formal
education (often contrasted with 'material',i.e. purely
subject-based education).

Combining Weltbewältigung, i.e. mastery of life, and
'Personwerdung', i.e. the development of personality, is
the chief purpose of this school of educational thinking.

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7 From 'Das Exemplarische im Bildungsraum des Gymnasiums', quoted by
   Ruprecht, in Ruprecht et al. (1975 p. 28) and elsewhere.

Klafki's wording of this principle, in which he explains
Bildung as the surrounding world being open to man (the
material and objective aspect) and man being open to this
reality (the formal and subjective aspect) (Klafki 1975 p. 43),
is quoted again and again in German educational literature
with expressions of deep respect.

This seems - and largely also is - a speculative approach.
It is an historical but still powerful exponent of German
thinking. There seem to me to be two rather different present-
day outcomes of the school of Bildungstheoretische Didaktik.

One is, as already indicated, related to the Frankfurt
School of social science which, in the interest of
'emancipation', allows political decisions to control
research and refrains from objectivity in applying its
own values.

The second outcome is more trivial. In the latest presentation
of the Bildungstheoretische Didaktik known to me, Klafki
underlines some general principles, which can hardly cause
much controversy as typical of this school, thus: (1) the
importance of the development of the learner's capacity for
autonomoy and solidarity; (2) the connection of teaching
and learning as a process of interaction by means of which
learners gradully acquire more independence and not only
learners but also teachers learn; (3) discovery learning
and understanding as opposed to mere rote learning; (4) the
participation of learners in the planning and realisation
of teaching and (5) the concept of social learning (Klafki
1980). This thinking has been developed into a not very
sensational perspective scheme and a model for the planning
of teaching. Important background considerations are
evidently critical examinations of social inequality and of
conditions related to social class and regional provenance.
The interrelationship of society and education is stressed.

The influence of this traditional school with its claims to

be able to prescribe values in the form of decisions about
the aims and content of study is, as indicated, still
strong in Germany. The same applies to the Frankfurt school
referred to above. It is typical of this school that it
rejects the assumption that scholarship should attempt to
be neutral in relation to value judgements. This assumption
is supposed to contribute to conserving the status quo.
Theodor Adorno compares the separation of value judgements
from research with capitulation before power, Jürgen
Habermas states that it deprives analytical-empirical
investigations of their contact with reality (Lebensbezug)
and the advocates of this approach, generally in Marxist
terms, stress the importance of considering society as a
totality inclusive of its mechanisms of compulsion (cf.
Adorno 1975, Horkheimer 1974 and - for a critical discussion -
Kromphardt & Clever 1975).

This can all be related to the view that not only education
but educational research should have as its main task to
change society (in the direction of some kind of socialism
or - in any case - anticapitalism) rather than to reveal
and explain reality and/or create a basis for technology
which indicates how and by what means educational aims
can be obtained. When the adjective critical or the noun
criticism (as in Ideologiekritik) is used, the idea is
usually that traditional, bourgeois conceptions should be
criticised, whereas so-called progressive virtues and aims
are taken for granted.

The Frankfurt school calls its message the 'critical theory'.
A so-called pedagogy of the critical theory has been
developed. It implies on the one hand rejection of capitalist
society, on the other hand great appreciation of an exchange
of ideas and 'communicative competence', expected under
ideal circumstances to lead to consensus. Although these
ideal conditions do not exist, man is expected to act as
though 'the ideal speaking situation' were reality, which
is assumed to imply that the better argument consistently

prevails so that consensus may be attained. The regulative idea of the ideal speaking situation is supposed to legitimate educational goals and norms for action and further to reveal conditions which make it possible to query claims of validity with a view to attaining 'true consensus' (Mollenhauer 1978 2, pp. 79-85).

Another model to be mentioned in this context is represented by the so-called communicative or Critical-communicative didactics, an approach introduced by Karl Hermann Schäfer und Klaus Schaller. This school is quite explicit in stating that it does not limit its functions to the concerns of teaching/learning: its aims is the Comenius motto 'emendatio rerum humanarum', i.e. to improve society, whatever that may mean. In the form of a model it systematises the communicative aspects of didactics in two main categories (Bedeutungsebenen), on one hand the truism that teaching is a communicative process, on the other hand the demand that teaching and learning ought to become more communicative, i.e. more learner-oriented, more co-operative, more transparent, more participative and independent, less subjected to disturbance (Winkel 1980 p. 200). The former category is described as constituted by 'eleven axioms'. Teaching is studied under four aspects, (1) mediation (Vermittlung), (2) content (Inhalte), (3) relations (Beziehungen) and (4) disturbance (Störfaktizität), which may be a fruitful procedure when would-be teachers analyse teaching situations they are observing. Further, detailed systematic schemes for the planning of lessons etc. have been developed.

Ideological conflicts in the models discussed

It is evident that some of the models discussed represent positions within a philosophy of education leading to explicit concerns about ideological issues; on the other hand they aim at guiding the teaching-learning process and

for this purpose develop various schemes systematising
the concepts that are important to them. This systematising
can undoubt.dly be helpful in some situations and plays
some part in teacher training.

There is one line of division that is highly relevant in
the ideological domain. Felix von Cube, the creator of
the cybernetic redundancy theory, insists that value judge-
ments can never be regarded as statements derived from
research or scholarship and that thus they have no place
in educational research. This is contradictory to the
presentation of various kinds of moral aims (emancipation,
for instance) as based on scientific considerations.

The interaction of value judgements and educational research
is a fact that we may regret, but that cannot be overlooked.
Travers is evidently right when he says,

> Many of the most persistent problems of education are
> ethical and moral and cannot be solved by the procedures
> that the scientist typically pursues. ... The scientist
> working on educational problems cannot entirely escape
> such questions even though he is in no position to
> provide answers.
>
> (Travers 1969 p. 6)

What the schools introduced above under Bildungstheoretische
Didaktik and Critical-communicative didactics, as well as
some representatives of the Berlin-Hamburg school, are not
prepared to accept is the last part of this statement, i.e.
that resear . and scholarship cannot solve value problems.
Instead, they make their value systems (participative
democracy, emancipation, etc.) the basis of their research
(as explicitly stated by, e.g. Klafki 1976). Löwisch (1974
pp. 50 - 51) declares criticism to be productive through
contributing an imperative in the form of an idea that
serves as a regulator. To Mollenhauer (1973 p. 10)
emancipation is the overriding idea both in education and
in educational research. This normative approach is, of
course, very different from recognising that it can be

necessary and desirable in educational research to identify
and describe values and their influence.

What has been said so far may have gi en the impression
that the German educational debate i dominated by those
influenced by the Frankfurt school and its explicit
partisanship. This is not the case, but this thinking is
nevertheless widely spread as exemplified above. On the
other hand there is also in Germany a fight against
anything connected with obscurantism (here Wolfgang
Brezinkas, Felix von Cube's and Lutz Rössner's names stand
out), and no doubt many German educationists are inclined
to agree with Kerlinger in his verdict:

> Such phenomena as ... targeted research, programmatic research,
> and, in Europe, emancipation research are mostly bizarre nonsense,
> bandwagon-climbing and guruism, little related to what research
> is and should be.
>
> (Kerlinger 1977 p. 10)

Under the influence of Karl Popper important contributions
to the educational debate have been made advocating
objectivity attained by pluralistic discussions but
naturally recognising the inevitable bias of individual
scholars, thus, for instance, by Wolfgang Brez...ka and
Hans Albert.

There is also an interesting controversy to be considered
which concerns the influence of tradition on the content
of education. This is clearly and rather aggressively
verbalised by Blarkertz in his criticism of von Cube
(Abschlussdiskussion 1980 p. 248). The latter is said to
regard non-technological values as emanating from arbitrary
considerations (by refusing to accept value judgements and
decisions on educational objectives as the result of
scholarship). To Blankertz the content aspects, i.e. the
objectives, have been provided for in a binding way by the
educational traditions (referred to as 'European pedagogy').

He thus accuses von Cube of a denial of European
scholarly history. This is a way of reasoning which is
clearly based on the concept Bildung and illuminates
the strong influence of the Bildungstheoretische Didaktik
on pres nt-day educational thinking in Germany.

Another difference of approach, concerned with the concepts
of understanding and explaining, should also be mentioned.
A study of the process of education will result in a
description and an interpretation. The interpretive
element has been called hermeneutic under the influence
of the German school of 'Bildungstheorie'. One of the
theses of its originator, Wilhelm Dilthey, was that whereas
natural science deals with repeatable phenomena, the
humanities are concerned with unique circumstances. In the
latter case research is taken to aim at understanding, in
the former case at explanation. Explanation can evidently
lead to prediction and technology. Cf. Jarvie 1970 p. 231.
To Dilthey and many latter-day representatives of 'Bildungs-
theorie' understanding rather than explanation is the aim
of educational research. Whereas this thinking for many
years played little part outside the European continent
it has been given considerable attention in the 1970s.
Herm eutics has become something of a term à la mode, and
reference to the hermeneutical view of the development of
understanding in almost concentric circles, i.e. like a
spiral, through repeated readings of a text, occurs fairly
frequently (cf. Lindholm 1979, Palmer 1969). Gadamer 1975
appears to have influenced the debate strongly.

In fact, there seems to be little reason to dramatise the
difference between the two approaches referred to, understanding
and explanation. Irrespective of terminology and research
tradition there is inevitably a need for description and
interpretation of educational processes. Interpretation of
what occurs may be an activity carried out for its own sake
to illuminate human intentions and purposes, but may also
serve the purpose of explanation, possibly leading to

prediction, and vice versa (Radnitzky 1970, Apel 1972).
Huschge-Rhein 1979 postulates a difference of degree
('gradweiser Unterschied') between understanding and
explanation. Cf. Nicolin 1981 p. 77.

The conclusions that can be drawn from interpretations are
necessarily in many cases rather uncertain. Nevertheless
they can illuminate the educational process and its frame
factors in a very useful way as evident from experiences
made in evaluation projects. Whereas in work of this kind
attitudes and experiences are usually studied by
questionnaire methods supplementing analyses of students'
achievements, some educators go further in their attempts
to give a complete picture of the students' situation,
their interaction with the course and their particular
difficulties. For this reason attempts have been made to
find out not only what students' learning conditions are,
but also what their life in general is as related to their
study situation. This approach, which thus pays particular
attention to the study milieu, is sometimes referred to as
'evaluation as illumination' (Parlett & Hamilton 1972).
In-depth interviews are made with individual students with
a view to coming to grips with what happens to them, to
their life while they study, rather than to sample the
general reactions of the students to the course under
study, which is what happens when questionnaires are used.
Duchastel refers to this as a pluralistic approach of
course evaluation which seeks "to exteriorize the deeper,
phenomenological impact which the course was hoped to have
on a good number of the students" (Duchastel 1976 p. 4).
See further Elton & Laurillard 1979.

For no good reason these interpretative attempts aiming at
understanding are sometimes regarded as antagonistic to
studies concerned with the effectiveness of education
(Elgqvist-Saltzmann 1976; cf. Gage 1963 pp. 113 - 129 on
'criterion-of-effectiveness' paradigms versus 'teaching
process' paradigms). Evidently both interpretation for the

sake of understanding as an aim in itself and interpret-
ation as an instrument serving purposes of effectiveness
are legitimate and important tasks for educational
researchers. Understanding can be regarded as a heuristic
operation on which hypotheses are based (Abel 1948).
Further cf. Strike 1972. This leads us to a consideration
of methodological problems.

Models concerned with educational research methods

No scholarly method is unproblematic. Sensible application,
an open mind to weaknesses and cautious conclusions are
necessary corollaries to any truth-seeking procedure. Many
findings are necessarily approximations. Their degree of
certainty or uncertainty is related to the methodology
applied. If interpretations are taken to provide more than
linguistically secured information, there must needs be a
considerable element of uncertainty. This concerns all
hermeneutic understanding and interpretations (cf. Taylor
1971) and evidently also the interpretation of empirical
findings.

Causal theories are usually tested statistically in that
correlations between variables in a large number of cases
are searched for. Here we come up against difficulties of
inference. If a computed correlation coefficient is found
to be significant, it gives information about the
probability that there is a correlation in the population
concerned only. Educationists must be very cautious in
drawing generalising conclusions from correlation analysis
and statistical inference generally (cf. Lessnoff 1974
pp. 67 - 74).

Other difficulties are also to be faced when empirical
methods are applied to testing theories. As Popper has
shown it is not possible conclusively to prove that a
nomological theory, i.e. one assumed to be universally valid,

is true, but it may be possible to falsify it and replace
it by a better one. The combination of empirical
falsification with the emergence of a new theory will
lead to the rejection of the former. On sophisticated
versus naive falsification see Lakatos (1970 pp. 116 - 132)
and on statistical discorroboration instead of falsification
see Lessnoff 1974 p. 20. If Popper's principle of deduction
and falsification is adhered to, normal statistical inference
does not seem to be wholly satisfactory as it is concerned
with generalisations induced from collections of data, thus
with induction and probability rather than with deduction
and falsity.

> In sum, statistical "tests of significance" which operate
> by comparing an observed distribution with one which
> "might have been expected by chance" turn the basic logic
> of statistical manipulation of variables inside out,
> reversing the methodology of falsificationism, and
> producing a verificationist bias. From our point of view,
> then, such tests must be considered inappropriate for
> purposes of hypothesis testing and, if they have a place in
> our methodology, this should be limited to the preliminary
> stages of theory formation ...   (Ford 1975 pp. 405 - 406)

This would seem to be a rather pointed conclusion. It should,
however, be borne in mind when testing procedures are
considered.

In my view the greatest difficulty is that scholars may not
draw a clear line of division between what they think
reality should be like and what findings actually show.
This is crucial for the credibility and respectability of
educational research. This risk occurs in all kinds of
research, also those which concern topics unlikely to stimulate
partisanship[8]. Pet ideas have great capacity for surviving.

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8 Thus for instance, I have experience of this from philology and
   linguistics concerning problems like the authorship of 'Sir
   Thomas Moore' (a Shakespeare drama?) and tne eighteenth century
   pronunciation of the vowel in words like cup (cf. Tannenbaum 1927
   and Holmberg 1957 respectively). The phenomenon is no doubt well
   known to scholars in entirely different areas as well.

To meet this challenge requires pluralism and makes it vital that theories should be subjected to rigorous testing in the sense of Popperian falsification attempts. The problem is particularly great in the social sciences and education, where political bias and various kinds of wishful thinking tend to distort scholarly observations.

Interesting contributions to the philosophy of science made by Marxist thinkers make the risk for ideological distortion evident as they accept as a kind of creed a number of statements about the relations between the objects of research, a. well as a class concept that seem‹ less than crystal clear, and also adopt a starting position for social research which is based on an openly partisan, non-neutral, class philosophy. Their work is based on a belief that they are already in possession of the right basic solutions or approaches. Marxism also claims to make knowledge a revolutionary weapon (Liedman 1977 p. 46), a message not likely to be easily accepted by non-Marxists.[9] In any case it differs from general research endeavours aiming at truth-finding and refraining from political or religious commitments. If the political Marxist aims are rejected, the Marxist research position is clearly irrational.

Education as a research area is particularly vulnerable to bias as it is concerned with human beings with personalities, hopes and wills of their own. If we are not determinists in the sense that we totally reject the assumption that human will is in any respect free, then it is impossible to postulate any automatic cause-effect principle in research aiming at optimising educational methods and procedures.

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9   This should be qualified with a reference to the Popperian view of the principle of falsification as a weapon against dogmatic and totalitarian thinking - but not in favour of certain answers.

Here theories usually have to be limited to statements
to the effect that _if_ such and such a measure is taken
under specific circumstances, _then_ this is likely to
facilitate learning. This can be reworded into the semblance
of a nomological theory: if x, then conditions making y
possible will be created. Nevertheless here we have
something resembling 'Popper's idea of probability as a
dispositional property of a situation with respect to some
precipitating circumstance' (Scriven 1972 p. 110). The
situation is somewhat different in general learning theory
and other descriptive rather than prescriptive studies.[10]
It has been stated that an agent's decision-scheme, i.e.
set of attitudes to reality, problems and solutions, dictates
what he will do if he acts rationally: when A, then the
rational action will be B (Lessnoff 1974 p. 89 on Watkins'
'imperfect rationality').

Conclusion

The above discussion has shown that the model concept -
though vague - is widely used. Studying various well-known
'models' actually implies surveying important theoretical
approaches, categories and methods used in education and
educational research. Those discussed above represent a
selection which, though not wholly idiosyncratic, was
made both with a view to including some German thinking
largely unknown outside the German-speaking countries and
on the basis of personal interest. The author's research

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10 The problems related to the concept of cause and effect in
   educational research and the endeavour to relate cause-effect
   relationships to statistical correlations have been studied by,
   for instance, Elton 1977 and Elton & Laurillard 1979. In social
   science generally this problem area has been much discussed.
   It is interesting to note that Durkheim 1964 considers explanation
   of social facts to be deterministic, not purposive: "a social
   fact can be explained only by pointing out another, antecedently
   existing social fact, such that the two sorts of social
   fact are positively correlated" (Lessnoff 1974 p. 97). Lessnoff
   stresses that "only perfect correlations of cardinal data are
   equivalent to universal laws of functional dependence"
   (Lessnoff 1974 67 - 71 and 97).

orientation toward adult and distance education constitutes
part of the background for the examples selected. Other
scholars would, no doubt, choose others.

The conclusion to be drawn from the above discussion and
examples would seem to be that the description of a research
phenomenon in education as a model can be useful if
referring to distinctive, clearly delineated approaches.
It can then include factual descriptions, presentations of
hypothetical relations between variables and general inter-
pretations of educational phenomena.

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